APPENDIX C
MEASUREMENT OF RESIDUAL CHLORINE
(N, N-DIETHYL-P-PHENYLENEDIAMINE (DPD) METHOD)

C.1 GENERAL.

The instructions for the LaMotte-Palin DPD Chlorine-pH test kit are provided below. Instructions are keyed to this kit because of its applicability to swimming pool monitoring for pH and chlorine residuals. Other kits can be utilized in lieu of this recommended kit; consult manufacturers' specific instructions as required. The installation medical authority must approve the use of other kits. The above kit can be ordered using the nomenclature in paragraph B.7. Field test kits can be used for testing other operational parameters (e.g., alkalinity). Consult manufacturers for information on these items. Generally, free available chlorine will be the only necessary chlorine test. Other methods are presented to be utilized only if necessary (e.g., when free available chlorine drops off or is nondetectable).

C.2 PROCEDURE I: FREE AVAILABLE CHLORINE, MONOCHLORAMINE, DICHLORAMINE AND TOTAL RESIDUAL CHLORINE.

a. Free available chlorine:

(1) Rinse the test tube with the test sample, then fill to the mark.

(2) Add one DPD No. 1 rapid-dissolving tablet.

(3) Cap the test tube and shake to dissolve the tablet.

NOTE

All comparator readings should be made in direct light with a sunlight background.

(4) Immediately insert the test tube in the comparator and match the color of the sample with the color standards. Color matching should be completed within 1 minute from the addition of the DPD No. 1 tablet. This is the free available chlorine concentration of the test sample. Identify this as Reading A.

(5) Retain this test sample if the inonochloramine determination is to be made.

b. Monochloramine.

(1) To the test sample from step B2a(5) above, add one DPD No. 2 tablet. Cap the test tube and shake to dissolve.

(2) Compare the resulting color with the color standards and identify this as Reading B. Any increase in color over Reading A is due to monochloramine. Thus, Reading B minus Reading A equals monchloramine content.

(3) Retain this test sample if the dichloramine determination is to be made.

c. Dichloramine and total residual chlorine:

(1) To the test sample from step B2b(3) above, add one DPD No. 3 tablet. Cap the test tube and shake to dissolve.

(2) Compare the resulting color with the color standards and identify this as Reading C. The increase in color over Reading B is due to dichloramine. Thus, Reading C minus Reading B equals dichloramine content.

(3) Reading C also represents the total residual chlorine content.

C.3 PROCEDURE II: FREE AVAILABLE CHLORINE, COMBINED CHLORINE AND TOTAL RESIDUAL CHLORINE.

a. Free available chlorine. Follow steps B2a(l) through (5) above. This is Reading A. Retain the test sample for the combined determination.

b. Combined chlorine and total residual chlorine:

(1) To the test sample from B3a above, add one DPD No. 3 tablet, cap, and shake to dissolve.

(2) Compare the resulting color to the color standards and identify this as Reading C. Any increase in color over Reading A is due to combined chlorine (inonochloramine plus dichloramine). Thus, Reading C minus Reading A equals combined chlorine content.

(3) Reading C also represents the total residual chlorine content.

C.4 PROCEDURE III: TOTAL RESIDUAL CHLORINE.

The DPD No. 4 tablet provides a one-step determination for total residual chlorine and is used where it is not necessary to distinguish the separate chlorine fractions.

a. Rinse the test tube with the test sample, then fill to the mark.

b. Add one DPD No. 4 tablet, cap, and shake to dissolve.

c. Compare the resulting color with the color standards. This reading represents the total residual chlorine content.

NOTE

In situations where total residual chlorine values of more than 6.0 p/m are

encountered, the test sample should be diluted with one or two times the sample amount with chlorine free water to bring the chlorine concentration within the test range of the Octet comparator. The test result is then multiplied by the appropriate factor. For example, if one part test sample is diluted by one part chlorine-free water, the test result is multiplied by a factor of two.

C.5 PROCEDURE IV: pH TEST.

The Lamotte-Palin Phenol Red Indicator Tablet contains Halidex that eliminates the bleaching effect of chlorine or bromine on the pH indicator dye. No additional treatment is required when the halogen level is below 8.0 pm.

a. Rinse the test tube with the sample, then fill it to the mark.

b. Add one LaMotte-Palin Phenol Red Indicator Tablet, cap, and gently shake to dissolve.

c. Immediately insert tube in comparator to obtain color match. If the test sample color is in between two standard colors, the midpoint between the two standard values is taken as the value of the sample.

C.6 PRECAUTIONS FOR USE OF TESTING EQUIPMENT.

The following suggestions are made in order to obtain the maximum performance from this equipment:

a. Follow all instructions with great care.

b. Carefully wash and rinse all apparatus used in the test procedure.

c. Tighten the reagent container caps immediately after use. Do not interchange caps.

d. Avoid prolonged exposure of all test reagents to direct sunlight.

e. Avoid extreme high temperatures and protect all test components from freezing.

f. Anticipate requirements for replacement reagents.

g. Keep the reagent containers locked up in a cabinet.

C.7 EQUIPMENT.

If new equipment kits are needed, or available equipment is not adequate, DPD chlorine residual kits should be ordered using the following information:

a. NSN 6630-027-3914, COMPARATOR, COLOR, Chlorine and pH Determination, DPD Method. Kit contains tablets for determining the presence of free chlorine, inonochloramine, dichloramine, total chlorine residual and pH. Cost: $59.95. This kit may be deleted from the Federal Supply System, however, it will be available by local purchase from the LaMotte Chemical Products Co., Box 329, Chestertown, MD 21620, telephone: 301-778-3100, as Model No. LP-8, Code 6980.

b. Installation personnel must order this kit through supply procedures for ordering local purchase items. Installation procurement personnel shall handle all the local purchase administrative requirements.

c. DPD No. 1 tablets are available through the Federal Supply System (NSN 6810-01-044-0315).

d. Other reagents to refill those supplied with the kit (DPD #2, #3, #4, and pH tablets) are not available through the Federal Supply System. Installation procurement personnel should be contacted for these requests.